APPARATUS AND METHOD FOR INSTALLING AND REMOVING A HARVESTING COMBINE ROTOR

FIELD OF THE INVENTION

This invention relates generally to the field of agricultural crop harvesters. It relates particularly to agricultural crop harvesters such as combines and, more specifically, to an apparatus and method for installing and removing a harvesting combine rotor.

BACKGROUND OF THE INVENTION

Modern harvesting combines are generally equipped with an enclosed operator's cab in which the operator is seated to control the harvesting operation of the machine. Operator cabs are typically located at the front of the combine and are fixedly mounted to the frame of the combine at a predetermined height. These combines also typically include a main body portion located behind the cab. The main body portion typically includes an outer housing and a rotary threshing assembly including a rotor disposed within the housing. When installed, the rotor typically extends along the length of the combine. The rotor may be installed and removed through a front end of the housing.

There are several disadvantages associated with the fixed cab arrangement. In particular, the cab cannot be raised to facilitate the installation and removal of the rotor from the front end of the combine. Moreover, there is no way for the operator to adjust the height of the cab relative to the remainder of the combine to improve the operator's vision and comfort. Finally, there is no way to lower the height of the cab for shipping and storage.

Accordingly, it would be desirable to have an apparatus and method for installing and removing a harvesting combine rotor that overcomes the disadvantages described above.

SUMMARY OF THE INVENTION

One aspect of the invention provides an apparatus for installing and removing a harvesting combine rotor. A harvesting combine includes a frame portion and a linkage assembly operatively connected to the frame portion. A cab is operatively connected to the linkage assembly to allow the cab to be raised to allow the installation and removal of a combine rotor. The linkage assembly may preferably be rotatably connected to the frame portion. A

plurality of cab support mounts may be operatively connected to the linkage assembly and the cab may be mounted on the plurality of support mounts.

Another aspect of the invention provides an apparatus for installing and removing a harvesting combine rotor. A harvesting combine includes a body and a frame portion. A linkage assembly is operatively connected to the frame portion. A cab is spaced-apart from the body and is operatively connected to a linkage assembly to allow the cab to be raised to allow the installation and removal of a combine rotor. The rotor may preferably be installed and removed through a front end portion of the body. The combine may further include a housing having a front wall and the rotor may include a front end and a back end. The front end of the rotor may preferably be located adjacent the front wall of a housing and the rear end of the rotor may preferably extend upward from the front end.

Another aspect of the invention provides an apparatus for installing and removing a rotor from a harvesting combine. A harvesting combine includes a housing and a frame portion. A linkage assembly is operatively connected to the frame portion and a rotor is disposed within the housing. A cab is operatively connected to the linkage assembly to allow the cab to be raised to allow the removal of the rotor from the combine.

Another aspect of the invention provides a method of installing a rotor in a harvesting combine. A harvesting combine including a housing and a frame portion is provided. A linkage assembly is operatively connected to the frame portion. A cab is spaced-apart from the housing and is operatively connected to a linkage assembly. The cab is raised to an up position and the rotor is installed in the housing. The rotor may preferably be installed underneath the cab.

Another aspect of the invention provides a method of removing a rotor from a harvesting combine. A harvesting combine including a housing and a frame portion is provided. A linkage assembly is operatively connected to the frame portion and a rotor is disposed within the housing. A cab is operatively connected to the linkage assembly. The cab is raised to the up position and the rotor is removed from the housing. The rotor may preferably be removed underneath the cab.

The invention provides the foregoing and other features, and the advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiments, read in conjunction with the accompanying drawings. The detailed

description and drawings are merely illustrative of the invention and do not limit the scope of the invention, which is defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a preferred embodiment of a cab arrangement for a harvesting combine, which is made in accordance with the invention;

FIG. 2 is an enlarged partial side view of the embodiment of **FIG. 1** showing the cab in the down position;

FIG. 3 is an enlarged partial side view of the embodiment of **FIG. 1** showing the right side of the cab;

FIG. 4 is an enlarged partial perspective view of the embodiment of **FIG. 1** showing the back wall of the cab;

FIG. 5 is an enlarged front view of the embodiment of **FIG. 1**;

FIG. 6 is a top view of the embodiment of **FIG. 3**;

FIG. 7 is a perspective view of a preferred embodiment of the platform with the back portion removed and the linkage assembly shown in the down position;

FIG. 8 is an enlarged view of the circled region of **FIG. 7**;

FIG. 9 is a side view of the embodiment of **FIG. 3** showing the cab in the up position;

FIG. 10 is a front view of the embodiment of **FIG. 5** showing the cab in the up position;

FIG. 11 is a top view of the embodiment of **FIG. 9**;

FIG. 12 is a perspective view of the embodiment of **FIG. 7** showing the linkage assembly in an up position; and

FIG. 13 is an enlarged view of the circled region of **FIG. 12.**

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Referring to the drawings, and particularly to **FIG. 1**, a preferred embodiment of a cab arrangement for a self-propelled harvesting combine **10** is provided. The combine **10** is capable of harvesting crops such as, for example, corn, soybeans, and wheat. In the embodiment shown, the combine **10** includes an operator cab **12** and a body **14**. The body **14** may preferably include a housing **16** and various operating equipment such as, for example, a loop elevator assembly **18**, a grain tank **20**, a rotary threshing assembly including a rotor **22**, and a cleaning system including a chaffer sieve and a shoe sieve (not shown). The chaffer sieve and the shoe sieve are preferably

located below the rotor **22**. The rotor **22** preferably includes a front end **23** and a back end **27**. The front end **23** of the rotor **22** is located adjacent a front wall **29** of the housing **16** and the back end **27** extends upward from the front end **23** of the rotor **22**. As shown in **FIG. 1**, the body **14** of the combine **10** is generally located behind the cab **12**.

Referring to **FIGS. 2-5**, the cab **12** may preferably include a first side wall **26** (see **FIG. 2**) and a second side wall **28** (see **FIG. 3**) opposite the first side wall **26**. The first side wall **26** of the cab **12** may preferably include a first transparent panel **30** and the second side wall **28** may preferably include a second transparent panel **32**. The first and second transparent panels **30, 32** each may be comprised of glass. The cab **12** may also include a front curved transparent panel **34**. The front curved transparent panel **34** may also preferably be comprised of glass.

As shown in **FIGS. 1-3**, the cab **12** is spaced-apart from the body **14** of the combine **10**. As shown in **FIG. 4**, the cab **12** includes a back wall **36** that preferably includes a transparent window **38** that provides an operator seated in the cab **12** with enhanced visibility behind the cab **12**. In the embodiment shown, the transparent window **38**, together with the first and second transparent panels **30, 32** and the front curved transparent panel **34**, provides substantially 360-degree visibility from the cab **12**. The transparent window **38** may preferably be comprised of glass. One advantage of the spaced location of the cab **12** relative to the body **14** is that it provides ample distance between the cab **12** and the body **12** to provide an operator with enhanced visibility through the transparent window **38** of both the field and the various operating equipment located behind the cab **12**. Also, the spaced location of the cab **12** relative to the body portion **14** of the combine **10** provides improved aesthetics for the combine **10**.

Another advantage of the spaced location of the cab **12** relative to the body portion **14** of the combine **10** is that it allows a platform **40** (see **FIGS. 2-4** and **6**) to be positioned between the cab **12** and the body **14**. In the embodiment shown in **FIGS. 2-4** and **6**, the platform **40** extends substantially around the back wall **36** and first and second side walls **26, 28** of the cab **12**. The platform **40** may be comprised of a single structure or may be comprised of various sections depending upon the particular application. In addition, the shape and configuration of the platform **40** may vary depending upon the particular application. In the embodiment shown in **FIGS. 4** and **6**, for example, the platform **40** includes a first side portion **42**, a second side portion **44**, and a back portion **46**. The first and second side portions **42, 44** of the platform **40** may each preferably include a guard railing **43** extending upward from the first and second side

portions **42, 44** along a portion of an outer perimeter **45** of the first and second side portions **42, 44**. In the embodiment shown, the back portion **46** of the platform **40** includes a pair of step portions **48** located at opposite ends of the back portion **46**. The platform **40** may be mounted to the frame of the combine **10** or any of the various support structures of combine **10**. For example, in the embodiment shown in **FIG. 7**, the first side portion **42** of the platform **40** is mounted to and supported by a first horizontally oriented support member **50**. Similarly, the second side portion **44** of the platform **40** is mounted to and supported by a second horizontally oriented support member **52**. In the embodiment shown, the first support member **50** is substantially parallel to the second support member **52**.

Referring to **FIG. 7**, a bridge member **54** has a first end portion **56** connected to the first support member **50** and a second end portion **58** connected to the second support member **52**. The back portion **46** of the platform **40** may preferably be releasably attached to the bridge member **54**. The first support member **50** is attached to a first vertical frame portion **55** (see **FIG. 3**) of the combine **10** and the second support member **52** is attached to a second vertical frame portion **57** (see **FIG. 2**) of the combine **10**. The first and second support members **50, 52** and the platform **40** may preferably extend above the two front wheels **60, 62** of the combine **10** (see **FIGS. 2-3**).

Referring to **FIGS. 2-3**, the cab **12**, the body **14**, and the platform **40** define a passageway **70**. In the embodiment shown, the passageway **70** is formed between the back wall **36** of the-cab **12**, the back portion **46** of the platform **40**, and a front wall **29** of the housing **16**. The width of the passageway **70**, as defined by the distance (designated as A in **FIG. 2**) between the back wall **36** of the cab **12** and the front wall **29** of the housing **16**, may preferably be approximately **18-20** inches. The back portion **46** of the platform **40** is positioned between the back wall **36** of the cab **12** and the front wall **29** of the housing **16** and may preferably have a width (designated as B in **FIG. 6**) of approximately **18-20** inches. Accordingly, the platform **40** and the passageway **70** allow an operator to walk along the platform **40** through the passageway **70** directly behind the cab **12** to visually monitor and access the various operating equipment of the combine **10** from the platform **40**.

Referring to **FIGS. 7** and **12**, the cab **12** is mounted to a plurality of cab support mounts **80**. The cab support mounts **80** are in turn connected to a linkage assembly **82**. The linkage assembly **82** is rotatably connected to the first and second support members **50, 52**. The linkage

assembly **82** may be any conventional linkage assembly such as, for example, a four bar linkage, that allows the cab **12** to be raised and lowered. **FIG. 7** shows the linkage assembly **82** in the down position and **FIG. 12** shows the linkage assembly **82** in the up position. The linkage assembly **82** may also be raised or lowered by any conventional means such as, for example, a conventional hydraulic cylinder that provides hydraulic pressure. The linkage assembly **82** may also be raised and lowered with a ball screw or worm-gear drive. Alternatively, as shown in **FIGS. 3** and **9**, the linkage assembly **82** may be coupled to the feeder housing **84** of the combine **10** with a removable support rod **86**. In this manner, the up and down movement of the feeder housing **84** may be used to raise or lower the linkage assembly **82**. There are several advantages associated with being able to raise and lower the cab **12**. In particular, an operator can adjust the height of the cab **12** relative to the remainder of the combine **10** to improve the operator's comfort and vision. Moreover, the cab **12** can be lowered to the down position for shipping and storage of the combine **10**. Finally, the linkage assembly **82** provides a means to raise the cab **12** to facilitate the installation and removal of the rotor **22** underneath the cab **12** through a front end portion **31** of the body **14** (see **FIG. 1**).

To install the rotor **22** through the front portion **31** of the body **14** the cab **12** is raised to the up position (see **FIGS. 9-11**). As shown in **FIGS. 9** and **11**, when the cab **12** is being raised, the rotational movement of the linkage assembly **82** causes the cab **12** to move in a backward direction toward the front wall **29** of the housing **16**. As a result, the back portion **46** of the platform **40** may preferably be removed from the bridge member **54** so that the back portion **46** does not interfere with the movement of the cab **12**. When the cab **12** is in the up position, the rotor **22** is installed through the front end portion **31** of the body **14** underneath the cab **12**. When the rotor **22** is installed, the cab **12** may then be lowered to the desired operating height. The back portion **46** of the platform **40** may then be reattached to the bridge member **54**.

To remove the rotor **22** through the front end portion **31** of the housing **16**, the cab **12** is raised to the up position (see **FIGS. 9-11**). Again, the back portion 46 of the platform **40** may preferably be removed so that it does not interfere with the movement of the cab **12**. When the cab **12** is in the up position, the rotor **22** is removed through the front end portion **31** of the body **14** underneath the cab **12**.

While the embodiments of the invention disclosed herein are presently considered to be preferred, various changes and modifications can be made without departing from the spirit and

scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that come within the meaning and range of equivalents are intended to be embraced therein.